

Accounting for Differing Perspectives and Values: The Rail Industry



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Abstract This chapter reflects on how researchers have worked in different ways with industry in five research projects, investigating and implementing solutions for problems related to human and organisational factors (HOF). Three observations are presented on how improvements can be made in the management of HOF.

Keywords Railway · Organisational and inter-organisational relationships · Roles of researchers and managers

1 Introduction

We often think that our own view is the best one, though there are many different perspectives of work, the workplace and organisations. People in different roles, levels of management, business functions or disciplines (e.g. safety, human factors, human resources, management science) have interests in the management of human and organisational factors (HOF).¹ Safety is often explained as a priority, but other factors (such as financial costs, production statistics, customer satisfaction) can be priorities for some people. Attention can focus on control of obvious problems (e.g. accidents during normal operations), though a narrow focus can allow vulnerability to threats from less common issues, or those that are hard to solve, especially in complex contexts, with involvement of multiple organisations.

This chapter is structured around three observations, more specifically, steps or strategies that can be considered to improve the management of HOF. These have been identified from reflection on a selection of railway research projects carried out at the University of Nottingham. The observations are as follows: (i) that there is a

¹Human and organisational factors (HOF) as discussed in this chapter are considered to be synonymous with ergonomics and human factors (E/HF), as defined by the IEA—<https://www.iea.cc/whats/>.

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lack of clarity on how HOF should be managed alongside other business objectives; (ii) that there is a need to look again at the respective roles of researchers and managers in research and practice in HOF; (iii) that HOF can be viewed as a method or analysis tool to understand the reality of people at work or interacting with systems.

2 The Research Studies

Overviews of the five projects that have informed the observations on the management of HOF are given in the Tables 2.1, 2.2, 2.3, 2.4 and 2.5.

Table 2.1 Overview of research project 1

What do people do on the railway?	
Part A	The first piece of work supported the infrastructure manager in understanding their processes for rail engineering work [23], including observing engineering work sites, interviews with staff in various roles, and group meetings to develop, display and discuss typical working scenarios (e.g. [18]). This produced an in-depth understanding of work functions and risks, descriptions of contexts and human factors affecting performance of functions. Even though we identified thematic areas and recommended programmes of work to tackle these, we were not always successful in engaging with the client and there was a perception that this was not solving the problems quickly enough
Part B	The second study was carried out for the European Union Agency for Railways (ERA), who wanted to overcome perceived bias in the industry towards technical standards [14]. This focused on what people do in a wider range of frontline railway roles (driving, rail control, station dispatch, rolling stock maintenance, infrastructure engineering). This was important in identifying: different types of <i>organisational</i> and <i>individual goals</i> ; what people need to do (i.e. the <i>human functions</i>) in various <i>contexts</i> ; and the <i>safety relevant activities</i> associated with these human functions

Table 2.2 Overview of research project 2

Improving safety performance in the construction supply chain	
Context	In road/rail transport construction, projects are usually conducted by multiple organisations. Evaluating the success of interventions in this type of dynamic, multi-organisational context is not straightforward. Consequently, effective evaluation studies are often not carried out
Part A	21 interviews across the supply chain explored factors affecting leadership in multi-organisation projects [21]. 26 different examples of safety leadership have been identified, aligned with nine areas from literature (e.g. demonstrating safety as a top priority, enabling safety reporting)
Part B	The effectiveness of a suite of leadership interventions is being explored in a longitudinal study in six large engineering projects. Progress (what is being implemented and how) is being tracked using theory of change methodology [7] to make sense of the wide-ranging data

Table 2.3 Overview of research project 3

What do business leaders want?	
Context	It is not known whether industry decision-makers talk naturally about safety concepts from literature (e.g. top down/bottom up safety approaches, how different forms of risk can be addressed, the nature of communications, and resilience) or how these are useful to managers
Part A	25 in-depth interviews were carried out with rail industry leaders [12], to determine what senior executives/managers really want in relation to safety and business performance. The interviews provide insight to what leaders think about trade-offs involving safety, organisational structure, the desire for improvement and the challenges in implementing changes across the industry
Part B	Two business change programmes are also being tracked over an extended period. Research activities (interviews with programme managers, review of project documents and meetings, surveys and observational work with frontline staff) are collecting broad ranging data on the programmes and safety and business performance [11]. Emerging findings indicate that industry leaders have a good awareness of problems with implementation of change programmes

Table 2.4 Overview of research project 4

Railway suicide—A continuing threat to safety and performance on the railway	
Context	There are many known prevention methods for railway suicide, but there have been few efforts to evaluate their effectiveness [16]
Part A	A collaborative project between academic researchers and industry [16], developed and implemented a method to identify the most promising safety interventions for field testing
Part B	One of the promising fencing interventions has been evaluated over an extended period of time [25]. Detailed, descriptive data are being collected on the extent of implementation and the impacts of the safety intervention. Understanding the context into which the intervention is placed has been critical
Part C	A simple evaluation framework has been developed in conjunction with the industry to support the collection of better evidence on the effectiveness of various types of safety prevention measures [17]. In spite of engagement with the industry throughout the development process, difficulties were experienced when piloting the framework with industry partners. Very simple barriers hindered progress (e.g. lack of time, not knowing where to start collecting data)

Table 2.5 Overview of research project 5

Developing new lighting products for stations	
Context	This is an innovation project, led by an industry partner, with researchers working closely with industry to provide the underpinning theory and research support. The project considers: What characteristics or qualities of lighting (e.g. movement, intensity, colour) could influence behaviour (wayfinding and crowd movement)?
Part A	Review of state-of-the-art in lighting and stakeholder engagement to support the specification and design of new lighting products for stations
Part B	Evaluation of the effectiveness of new products (using human factors methods and new sensing technologies)

3 Observations on the Management of HOF

The projects had different aims and contexts, though some overlap in their focus. There is commonality in the methods, but also differences in their application. The three observations introduced initially in Sect. 1, are expanded below.

3.1 *The Lack of Clarity on How HOF Should Be Managed Alongside Other Business Objectives*

There are multiple goals (organisational and personal—Project 1, [14]) and different objectives that can take precedence in different situations and contexts [23]. The extent to which objectives such as safety and business performance can or should compete is not clear. The interviews with business leaders (Project 3) collected views on their priorities. It is too simplistic to view these as two-way trade-offs (e.g. cost vs. safety). In practice, there are likely to be inter-changeable priorities, from amongst two or more objectives. The importance of context in trade-offs needs to be recognised.

A second consideration is that many commercial ventures are conducted by an array of organisations for a defined period. There are opportunities for leadership interventions and supply chain management to influence processes and organisational practices along the supply chain (Project 2), but to date there has been little research in this area. Units in the supply chain should not be viewed as static or homogenous entities. There will be pockets of culture in organisations and variation in behaviours within an organisation, due to the relationships and influences in multi-organisational projects.

Survivability can be considered at the heart of organisational decision-making in many circumstances. Supply chain logic indicates that organisational transition can be expected over time from survival to growth [5]. As HOF scientists and practitioners, it is important to support transitioning from a goal of survivability of the organisation to one of fulfilment of organisational needs. This can include continued efforts to raise the prominence of safety and related factors and ensure that these receive appropriate consideration alongside other objectives.

It is clear that scientists need to work with industry to be able to understand the nature of the business trade-offs as a first step in determining organisational priorities in a transitory multi-organisational context. This could include providing the tools to specify and work with data from industry and providing descriptions of the contexts and situations in which these trade-offs can occur. Doing this within a truly collaborative environment is desirable, though this is rarely achieved in practice. The respective roles of two of the stakeholders (researchers and users of HOF research, e.g. managers, practitioners, [3]) are considered in more detail below.

3.2 Looking Again at the Roles of the Researcher and Manager

In our projects, there were differences in the roles of the researchers and how they interacted with industry, potentially impacting on the success of the project. Implementation of a solution from academic or industry-based research is not a straightforward exercise. We have learned by experience about what can help build and inhibit collaboration in projects, such as differences in the motivations, experience, knowledge and expectations of ourselves and the other stakeholders.

In Project 1 we worked closely with industry over extended periods in the early, data gathering phase, but we could not maintain this type of collaboration through all of the research and implementation phases. We encountered similar problems in sustaining engagement in Project 4. What may appear to be good fortune (an insider researcher, [1]) facilitated access to interviews with senior decision-makers in Project 3, identifying different perspectives within and between organisations. Here the role of the researcher was critical. There are advantages to the manager-researcher (insider researcher) role, such as pre-understanding of the organisation and ability to manage organisational politics [1], often achieving results that are not possible from an outsider [4]. There are also challenges, where the manager-researcher has to “reframe their understanding” of the organisation, overcome problems associated with having a dual role [1] and various ethical issues [4].

Considering how to improve collaboration between researchers and operational staff is not a new question. Churchman and Schainblatt [2] reported that science and management need to know each other better. However, achieving “mutual understanding” [2], which is really at the heart of this problem, is not a simple endeavour. One explanation for this is that managers and scientists are not open about their real methods (e.g. how managers make decisions, or how researchers work creatively, [2]).

The researcher/practitioner gap has been explored in the discipline of ergonomics/human factors [19], pointing out problems of accessibility and usability of some academic methods. There has been reluctance to “give away” ergonomics methods to industry/novices [20], because of a required level of knowledge/expertise for the reliable and valid application of the methods. These findings on the utility of methods are important, but the interface between these groups needs closer scrutiny, to develop better collaborative work programmes. Reid et al. [15] have suggested that there is a bi-directional relationship, considering how to move ergonomics concepts from research to practice and ergonomics problems from practice to research. This is influenced by researchers (who worry about conducting “good research” for various reasons) and practitioners (who may not appreciate the value of well-designed research and feel that researchers’ interests may not align with their own).

Part of the solution to these problems is about developing better understanding of the different perspectives of those involved [15]. Whereas scientists attempt to form objective conclusions in a given set of circumstances (and at the risk of not being able to be conclusive), the manager in industry needs to make a practical decision, often in

spite of uncertainty in the evidence [9]. Neumann et al. [10] have explained how generalised knowledge of science is insufficient for successful change and needs to be absorbed and combined with the existing experienced based knowledge from practitioners in organisations. Action research [10] or participatory ergonomics to embed human factors in organisations [24] are promoted as ways forward for researchers to work collaboratively with stakeholders. I have very much appreciated the analogy provided by Francois Daniellou, of the need for “researchers with dirty hands”—placing researchers on the beach with the people, rather than viewing the people from the cliff-top.² In this analogy, researchers also need the ability to take the people to another viewpoint (e.g. mountain top). Elements of this close working with industry are evident within our projects. In Project 5, an industry partner leads the project and the motivation comes from the desire to market products. The industry is open to expertise of the researcher and potential value of scientific input. Researchers benefit from the commercial focus and clarity in priorities of the industry partners, but must be willing to be flexible and compromise, without sacrificing rigour, to reach a mutually agreeable solution.

A second set of considerations relates to the differing capabilities and limitations within these groups [3]. There are different job demands and needs across industries, and different knowledge, experience, backgrounds and education, within and between researchers and practitioners. Whilst it is right to consider the differences between research and practice, our experience indicates that there are also within group differences. As such, all partners in collaborations will lie somewhere on a continuum from pure research to pure application. We should not expect to unify or reconcile these differences and influences and the diversity has to be considered as an opportunity. We all need to reflect and be open about our weaknesses, in addition to promoting our strengths, and be receptive to new ideas and viewpoints [22] in order to find practical ways forward.

3.3 Viewing HOF as a Method or Analysis Tool to Understand the Reality of People at Work or Interacting with Systems

HOF should not just be viewed as a body of knowledge. The research projects have valued the description of work and contexts (“what people do”), usually as a part of achieving other project objectives (e.g. safety analysis or implementing and evaluating safety interventions). This description has placed an emphasis on “work as done” [8] and taken account of the wide-ranging stakeholders/organisations involved in running, maintaining or using the operational railway, and “listening to the people”

²Residential seminar held in January 2018 in Royaumont, France, which has led to this book (Editor’s note).

at the front line to support better decision-making. It was heartening to hear that this was also recognised by the managers of organisations (“people matter more than structure”, Project 3).

Our interactions with industry have also been designed to give a new view (for example using agent-based simulation, [13]), showing possibilities of what could happen. Our outputs are often in the form of simple, descriptive accounts, presenting findings from field studies in text, tables and figures. Findings can be represented in new ways, not necessarily collecting new data, but collating and compiling what already exists. This needs effort and time to do what others have not, looking again at the evidence, to make new connections in the data and help others to see what we can see. One of the challenges has been how to collate and analyse the findings in ways that are useful to both the academic and industry communities. There is a case to be made for developing better metrics and measures for the study of HOF and these are often preferred by managers and engineers. However, the value of qualitative data in research and practice is evident [6].

There are circumstances when application of our research methods needs time. For example, the evaluation studies (Projects 2, 4) and longitudinal studies (Projects 2, 3) benefit from the extended nature of these (e.g. part time Ph.D. process in some cases) and ability to track projects over lengthy time periods. This is exposing how change in business policy and practices can impact on the implementation and success of safety programmes. However, there have been situations where we have not been able to respond to the required pace of change (Project 1). We have also encountered situations where the industry has recognised how they have underestimated constraints on the speed or implications of change (Project 3). This introduces interesting questions about the existing approaches of researchers and industry staff in programmes of this nature.

4 Concluding Thoughts

The three observations offer directions for future research and practice. All work needs to operate within constraints (e.g. costs, resources, time available). However, we need to continue to promote our values and retain our disciplinary identities, especially around the importance of considering people, improving safety, life and health, otherwise we will be pushed further along routes that we do not want to go. The way of doing this is not clear, though success is likely to be found in identifying better ways to work together (especially researchers and managers), considering all business functions and all phases of exploring problems and implementing and evaluating solutions. Developing a better understanding of the different perspectives and capabilities/limitations of our partners is essential.

HOF scientists and practitioners are a body of many disciplines and backgrounds and this diversity has to be a positive thing. We need to look more carefully at the nature of our engagement and how we seek to collaborate or embed HOF in our workplaces. There have been some compelling arguments for better measures and

metrics. However, we must not lose focus on collecting and articulating details of the context (i.e. looking harder, looking differently or showing others what we can see) and developing the qualitative examples and case studies that can be used in timely and practical ways by industry to start working on their immediate needs.

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References

1. D. Coghlan, Insider action research projects. Implications for practising managers. *Manag. Learn.* **32**(1), 49–60 (2001)
2. C.W. Churchman, A.H. Schainblatt, The researcher and the manager: a dialectic of implementation. *Manag. Sci.* **11**(4) (Series B, Managerial), B69–B87 (1965)
3. P.G. Dempsey, On the role of ergonomics at the interface between research and practice, in *Congress of the International Ergonomics Association* (Springer, Cham, 2018), pp. 256–263, Aug 2018
4. A. Galea, Breaking the barriers of insider research in occupational health and safety. *J. Health Saf. Res. Pract.* **1**(1), 3–12 (2009)
5. C. Gurău, Supply chain organization and management in French SMEs: an exploratory study, in *MEQAPS 2011 Conference*, Barcelona, Spain, 15–17 Sept 2011
6. S. Hignett, J.R. Wilson, Horses for courses—but no favourites. A reply to three commentaries. *Theor. Issues Ergon. Sci.* **5**(6), 517–525 (2004)
7. D. Hills, K. Junge, Guidance for transport impact evaluations. Choosing an evaluation approach to achieve better attribution, Tavistock Institute, London, UK (2010)
8. E. Hollnagel, Human factors/ergonomics as a systems discipline? The human use of human beings revisited. *Appl. Ergon.* **45**(1), 40–44 (2014)
9. T. Lewens, Introduction: risk and philosophy, in *Risk: Philosophical Perspectives*, ed. by T. Lewens (Routledge, Abingdon, UK, 2007)
10. W.P. Neumann, S.M. Dixon, M. Ekman, Ergonomics action research I: shifting from hypothesis testing to experiential learning. *Ergonomics* **55**(10), 1127–1139 (2012)
11. M. Nolan-McSweeney, B. Ryan, S. Cobb, Getting the right culture to make safety systems work in a complex rail industry, in *20th Congress of the International Ergonomics Association*, Florence, Italy, 26–30 Aug 2018
12. M. Nolan-McSweeney, B. Ryan, S. Cobb, Challenges and strategies for an effective organisational structure in a complex rail socio-technical system, in *Sixth Rail Human Factors Conference*, London, UK (2017)
13. A. Perkins, B. Ryan, P.-O. Siebers, Modelling and simulation of rail passengers to evaluate methods to reduce dwell time, in *International Conference on Modeling & Applied Simulation*, Bordeaux, France (2015)
14. L. Pickup, B. Ryan, S. Atkinson, N. Dadashi, D. Golightly, J.R. Wilson, Support Study for Human Factors Integration—Human Functions in European Railways. Report for ERA. IOE/RAIL/13/03/R, University of Nottingham (2013)
15. C.R. Reid, D. Rempel, R. Gardner, S.L. Gibson, P.G. Dempsey, C. Whitehead, Research to practice to research: part 1—a practitioner’s perspective, in *Proceedings of the Human Factors*

- and *Ergonomics Society Annual Meeting*, vol. 60, no. 1. (SAGE Publications, Los Angeles, CA, 2016), pp. 896–898, Sept 2016
16. B. Ryan, V.P. Kallberg, H. Rådbo, G.M. Havârmeanu, A. Silla, K. Lukaschek, J.-M. Burkhardt, J.-L. Bruyelle, E.-M. El-Koursi, E. Beurskens, M. Hedqvist, Collecting evidence from distributed sources to evaluate railway suicide and trespass prevention measures. *Ergonomics* **61**, 1433–1453 (2018)
 17. B. Ryan, U. Wronska, I. Stevens, Evaluating rail suicide prevention measures, in *Sixth International Rail Human Factors Conference*, London, UK (2017)
 18. A. Schock, B. Ryan, J.R. Wilson, T. Clarke, S. Sharples, Visual scenario analysis: understanding human factors of planning in rail engineering. *Prod. Plan. Control* **21**, 386–398 (2010)
 19. S.T. Shorrock, C.A. Williams, Human factors and ergonomics methods in practice: three fundamental constraints. *Theor. Issues Ergon. Sci.* **17**(5–6), 468–482 (2016)
 20. N.A. Stanton, M.S. Young, Giving ergonomics away? The application of ergonomics methods by novices. *Appl. Ergon.* **34**, 479–490 (2003)
 21. S. Stiles, B. Ryan, D. Golightly, Evaluating attitudes to safety leadership within rail construction projects. *Saf. Sci.* **110**, 134–144 (2018)
 22. W. Ulrich, In memory of C. West Churchman (1913–2004) reminiscences, retrospectives, and reflections. *J. Organ. Transform. Soc. Change* **1**(2), 199–219 (2004)
 23. J.R. Wilson, B. Ryan, A. Schock, P. Ferreira, S. Smith, J. Pitsopoulos, Understanding risk in rail engineering work systems. *Ergonomics* **52**, 774–790 (2009)
 24. J.R. Wilson, Fundamentals of systems ergonomics/human factors. *Appl. Ergon.* **45**, 5–13 (2014)
 25. U. Wronska, B. Ryan, Using contextual information in the evaluation of the effectiveness of mid-platform fencing, in *Sixth International Rail Human Factors Conference*, London, UK (2017)

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